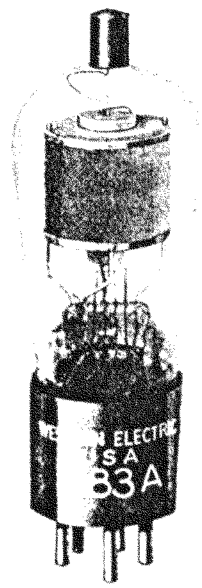
Western Electric

283A Vacuum Tube



Classification—Variable-mu, voltage-amplifier, screen-grid tetrode with indirectly heated cathode

Except for the variable-mu feature, the 283A tube is similar to the 259A tube.

Applications

High-frequency voltage amplifier, especially in circuits in which the amplification is varied by varying the control-grid bias of the amplifier tubes.

Audio-frequency voltage amplifier.

Dimensions—Dimensions, outline diagrams of the tube and base, and the arrangement of the electrode connections to the base terminals are shown in Figures 1 and 2.

Base—Medium, five-pin base with bayonet pin. Small, metal cap control-grid terminal at the top of the bulb.

Socket—Standard, five-contact type, such as the Western Electric 141A socket.

Mounting Positions—The 283A tube may be mounted in any position.

Average Direct Interelectrode Capacitances

Control grid to plate	0.004 μμf.
Control grid to heater, cathode and screen grid	6.5 μμf.
Plate to heater, cathode and screen grid	14 μμf.

Heater Rating

Heater voltage	2.0 volts, a.c. or d.c.
Nominal heater current	1.60 amperes

The heater element of this tube is designed to operate on a voltage basis and should be operated at as near the rated voltage as is practicable.

Cathode Connection—Preferably direct to the heater. If voltage must be applied between the heater and cathode, it should be kept as low as possible and should never exceed 90 volts.

Characteristics—Plate current and screen-grid current characteristics of a typical 283A tube are shown in Figures 3 and 4, respectively, as functions of plate voltage for a screen-grid voltage of 75 volts and several values of control-grid voltage. A typical plate current characteristic as a function of control-grid voltage is shown in Figure 5 for a plate voltage of 180 volts and a screen-grid voltage of 75 volts. The corresponding transconductance characteristic is given in Figure 6. For other plate voltages between 135 and 250 volts, the transconductance of a typical tube, for values above 5 micromhos, does not differ by more than ± 2 per cent from its value at 180 volts. Amplification factor and plate resistance characteristics as functions of control-grid voltage are shown in Figures 7 and 8, respectively for a screen-grid voltage of 75 volts and several values of plate voltage.

Typical Operating Conditions

Plate Voltage	Screen-Grid Voltage	Control-Grid Bias	Plate Current	Screen-Grid Current	Amplification Factor	Plate Resistance	Transconductance
Volts	Volts	Volts	Milliamperes	Milliamperes		Ohms	Micromhos
135	75	−1.5	5.8	1.7	410	310000	1330
180	75	−1.5	5.9	1.6	585	430000	1360
*250	75	−1.5	6.0	1.5	980	700000	1400
**135-250	75	−19	—	—	—	—	5

*Maximum operating conditions
**Nominal cut-off

Less severe operating conditions should be selected in preference to maximum operating conditions wherever possible. The life of the tube at maximum conditions may be shorter than at less severe conditions.

Microphonic Noise—With a plate voltage of 180 volts, a screen-grid voltage of 75 volts, a control-grid bias of −1.5 volts, and a load resistance of 100,000 ohms, the mean microphonic noise output level of the 283A tube measured in a laboratory reference test set is 18 decibels below 1 volt. The range of levels of individual tubes extends from 0 to 36 decibels. Since microphonic noise depends on the type and intensity of the mechanical disturbance which produces it, the values given here are useful chiefly for comparison with the levels of other tubes which have been tested in the same way.

Variable-Mu Feature—The 283A tube is particularly well adapted to amplifier applications where the sensitivity is controlled by varying the grid bias. As the control grid is made more negative, the plate current and transconductance approach zero gradually, as shown in Figures 5 and 6, rather than sharply, so that distortion is relatively small at all values of grid bias.

Circuit Requirements—In order to make use of the high gain per stage of which the 283A tube is capable when used as a voltage amplifier, suitable precautions must be taken where high frequencies are involved to avoid undesired feed-back in the circuit. It is usually necessary to use a close-fitting shield around each tube, to shield each stage of the amplifier circuit, to connect a low impedance condenser between each screen-grid and its corresponding cathode, to filter each battery lead to each tube and to avoid impedances common to the plate, screen-grid, control-grid, or cathode circuits of two or more tubes.

The screen-grid voltage should be obtained either directly from a low-resistance source or from a voltage divider. The use of a series resistance to reduce a high voltage supply to the desired value is not recommended because screen-grid currents differ widely in different tubes and vary during life in individual tubes.

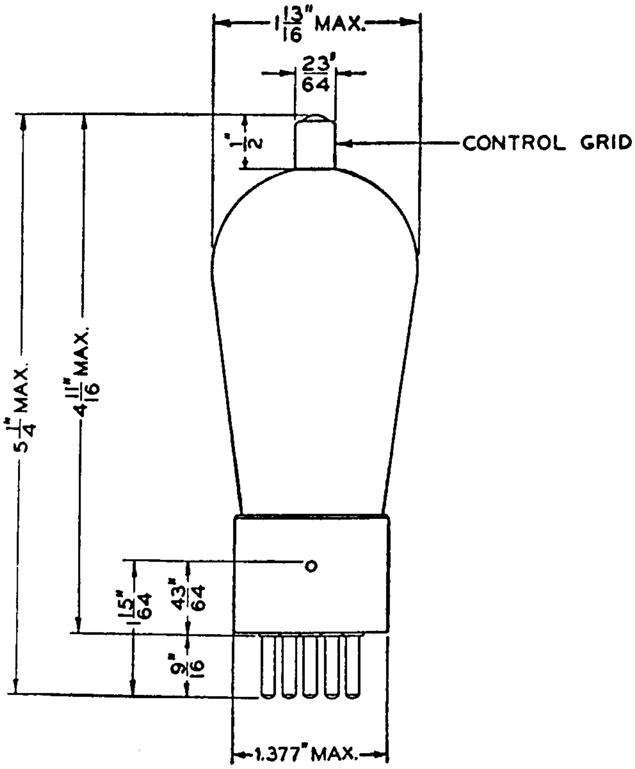


FIG. 1

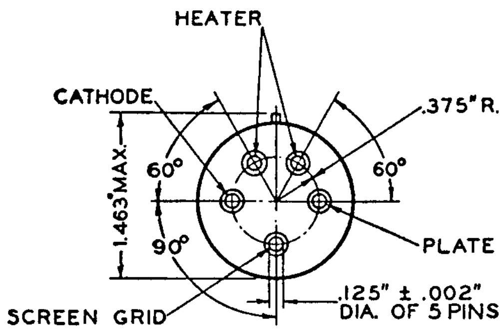


FIG. 2

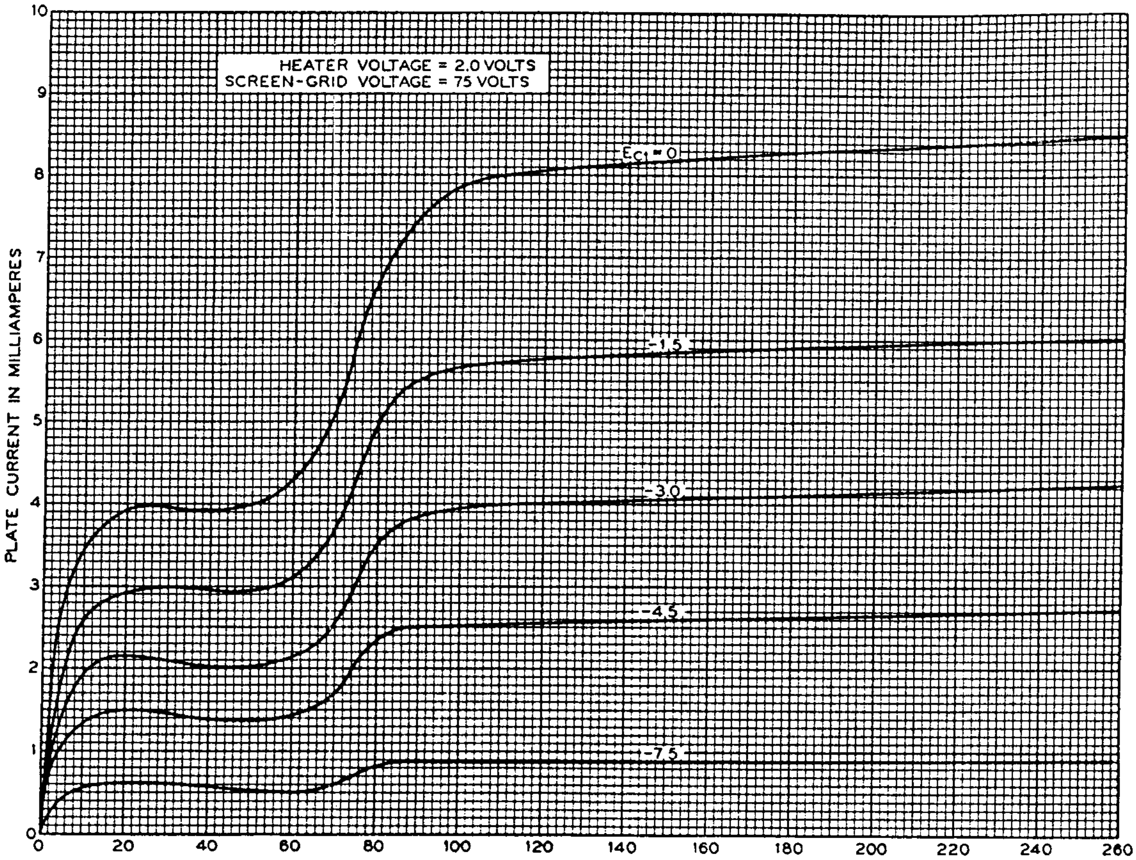

HEATER VOLTAGE = 2.0 VOLTS
SCREEN-GRID VOLTAGE = 75 VOLTS
PLATE CURRENT IN MILLIAMPERES
E_{C1} = 0
-1.5
-3.0
-4.5
-7.5
0
1
2
3
4
5
6
7
8
9
10
0
20
40
60
80
100
120
140
160
180
200
220
240
260

FIG. 3

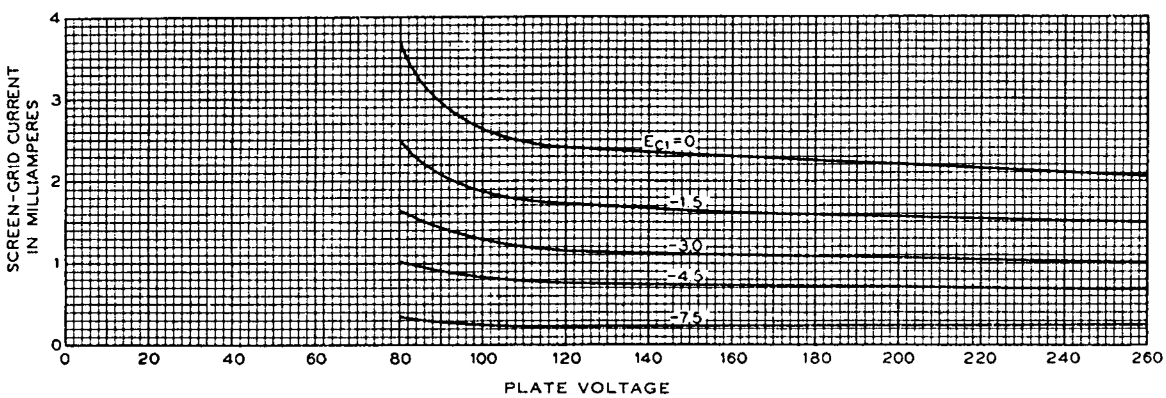
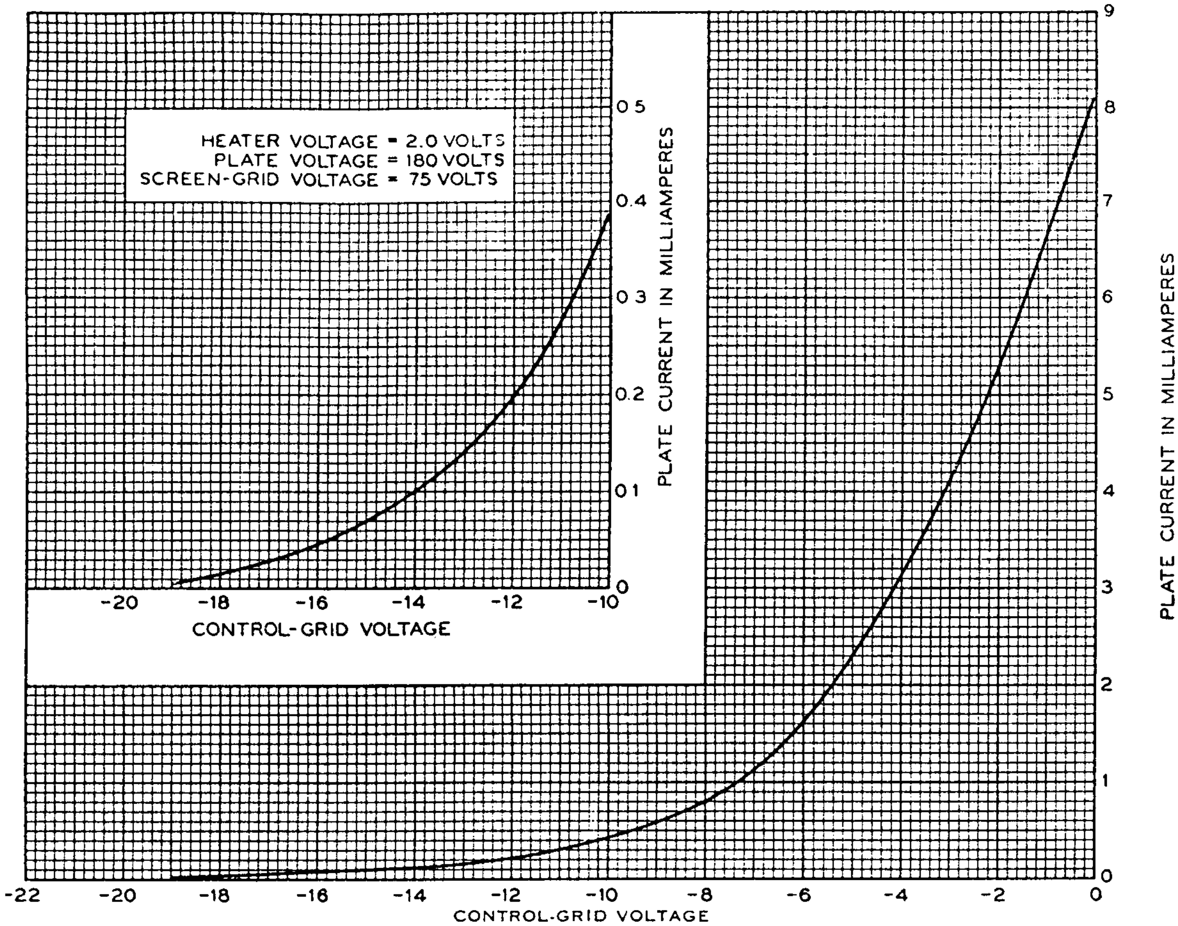
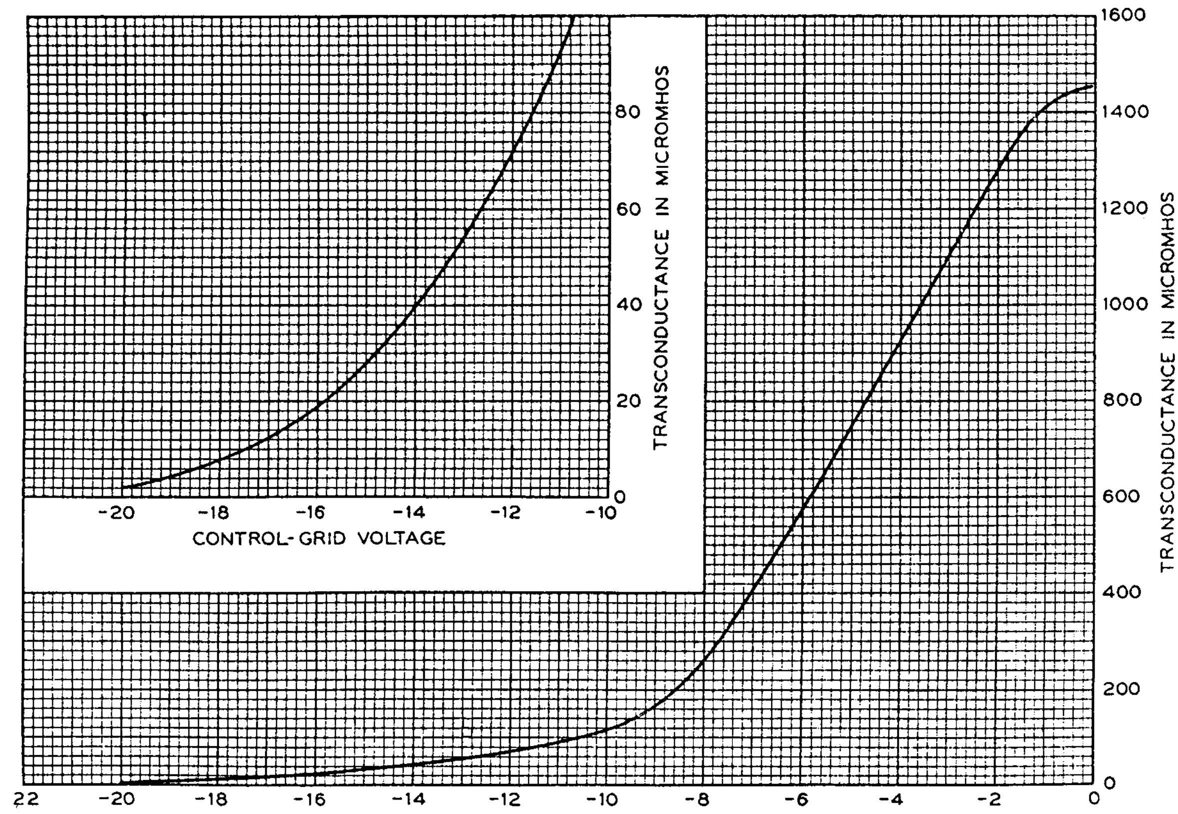

SCREEN-GRID CURRENT IN MILLIAMPERES
E_{C1} = 0
-1.5
-3.0
-4.5
-7.5
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
200
220
240
260
PLATE VOLTAGE

FIG. 4



HEATER VOLTAGE = 2.0 VOLTS
PLATE VOLTAGE = 180 VOLTS
SCREEN-GRID VOLTAGE = 75 VOLTS
PLATE CURRENT IN MILLIAMPERES
CONTROL-GRID VOLTAGE
PLATE CURRENT IN MILLIAMPERES
CONTROL-GRID VOLTAGE

FIG. 5



TRANSCONDUCTANCE IN MICROMHOS
CONTROL-GRID VOLTAGE
TRANSCONDUCTANCE IN MICROMHOS
CONTROL-GRID VOLTAGE

FIG. 6

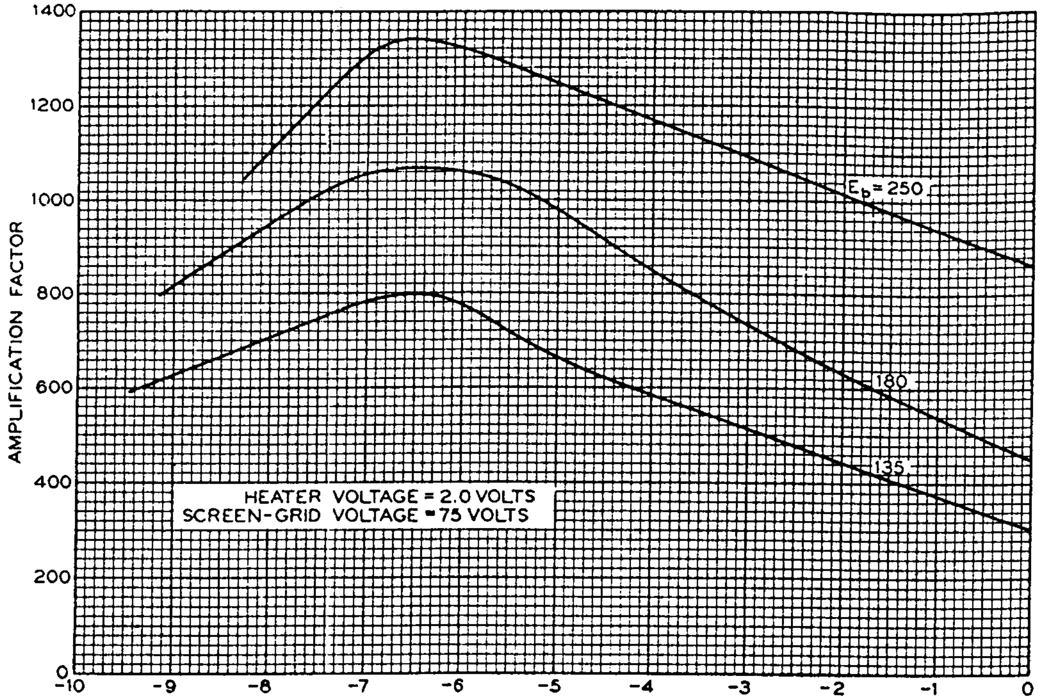


FIG. 7

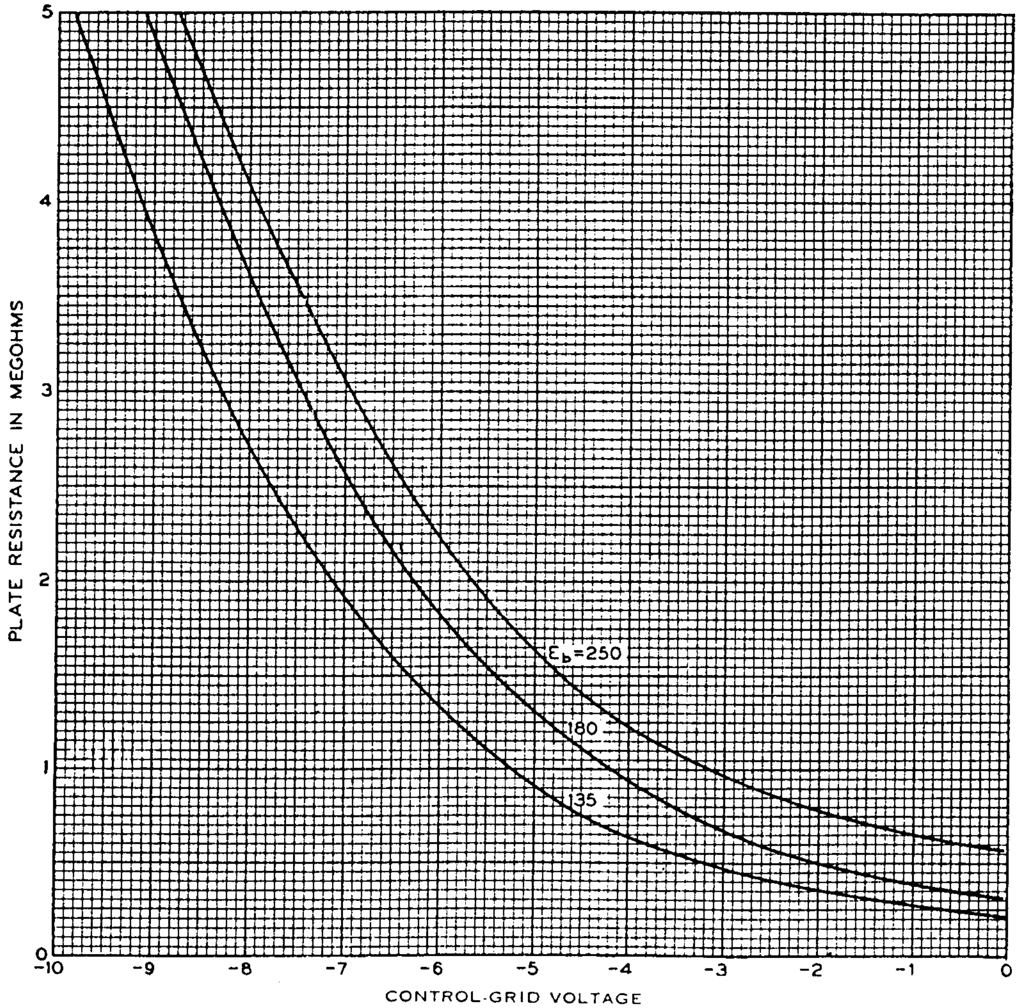


FIG. 8

A development of Bell Telephone Laboratories, Incorporated, the research laboratories of the American Telephone and Telegraph Company, and the Western Electric Company